THE

HICKOK

ELECTRICAL

INSTRUMENT

COMPANY

OPERATING INSTRUCTIONS

MICROMHO DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

MODEL 533A

CHOICE OF THE EXPERTS FOR SPEED, ACCURACY and DEPENDABILITY...

OPERATING INSTRUCTIONS

FOR

MICROMHO DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

MODEL 533A

APPLICABLE TO TESTERS HAVING SERIAL NUMBERS

ABOVE 136-10,000 OR 137-10,000

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THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 Dupont Ave.

Cleveland 8, Ohio

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STANDARD RETMA GUARANTEE

The Hickok Electrical Instrument Company warrants instruments manufactured by it to be free from defective material or factory workmanship and agrees to repair such instruments which under normal use and service, discloses the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing any instrument or test equipment which proves to be defective, when returned to us, transportation prepaid, within ninety (90) days from the date of original purchase and provided the serial number has been made known to us promptly for our records.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons or service stations in any way so as, in our judgment, to injure their stability or reliability or which have been subject to misuse, negligence, or accident, or which have had the serial number altered, effaced, or removed. Neither does this warranty apply to any of our products which have been connected, installed, or adjusted otherwise than in accordance with the instructions furnished by us. Accessories including all vacuum tubes not of our manufacture used with this product are not covered by this warranty.

This warranty is in lieu of all other warranties expressed or implied and no representatives or person is authorized to assume for us any other liability in connection with the sale of our products.

Parts will be made available for a minimum period of five (5) years after the manufacture of this equipment has been discontinued. Parts include all materials, charts, instructions, diagrams, accessories, et cetera, which have been furnished in the standard model.

RETURNING EQUIPMENT FOR REPAIR

Before returning any equipment for service, under warranty or otherwise, the factory must first be contacted giving the nature of the trouble. Instructions will then be given for either correcting the trouble or returning the equipment. Upon authorization, this equipment should be forwarded directly to the Hickok factory located at 10636 Leuer Avenue, Cleveland 8, Ohio, or to a designated service station in your locality. All correspondence pertaining to repairs should be directed to Hickok Electrical Instrument Company, 10514 Dupont Avenue, Cleveland 8, Ohio, or to the authorized service station designated.

REGISTRATION CARD

The above guarantee is contingent upon the attached registration card being returned to the factory immediately upon receipt of the equipment.

IMPORTANT

SEE INSTRUCTIONS FOR TESTING

FILAMENT CONTINUITY ON PAGE 5.

FUSE IN BIAS CIRCUIT

This Tube Tester is equipped with a fuse in the Grid Bias Circuit as a protection for the Bias Potentiometer in case an attempt is made to test a shorted tube.

NOTE: ALWAYS MAKE SHORT CHECK BEFORE MAKING QUALITY TEST.

The fuse is mounted in the main control panel where it is readily visible.

A burned out bias fuse lamp will result in failure of the mutual conductance meter to read when the Gm button is pressed. If the fuse lamp burns out, replace only with a No. 49 Panel Lamp.

AUTOMOBILE RADIO TUBES

IT OFTEN HAPPENS THAT AUTOMOBILES OPERATED AT NIGHT WITH RADIO, LIGHT, FANS, ETC., ALL TURNED ON AT THE SAME TIME, PUT SUCH A SEVERE LOAD ON THE AUTO BATTERY THAT THE BATTERY IS UNABLE TO DELIVER FULL VOLTAGE, ESPECIALLY IN SLOW MOVING TRAFFIC OR WHEN WAITING FOR TRAFFIC LIGHT. IF AUTO RADIO TROUBLE IS EXPERIENCED, MUCH TIME CAN BE SAVED BY FIRST CHECKING THE TUBES AT 6.3 VOLTS, THEN SWITCHING THE FILAMENT VOLTAGE TO 5 VOLTS. IF TUBE READING DROPS MARKEDLY AT 5 VOLTS, THE TUBE SHOULD BE REPLACED.

IF THE AUTOMOBILE HAS 12 VOLT RADIO SYSTEM, FIRST CHECK THE TUBES AT 12.6 VOLTS, THEN DROP TO 10 VOLTS FOR RECHECK.

HICKOK MODEL 533A MICROMHO DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

PACKER'S CHECK

MODEL 533A TUBE TESTER

SERIAL NUMBER _____

INSTRUCTION BOOK, MODEL 533A _____

DATE _____

SIGNED _____

PACKER

NOTE

READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO OPERATE THIS TUBE TESTER.

SECTION 1

DESCRIPTION

1. PURPOSE.

a. The Model 533A Tube Tester is used to test and measure mutual conductance values of vacuum tubes used in radio receivers and transmitting tubes delivering less than 25 watts of power.

b. The Model 533A Tube Tester is fundamentally of the Dynamic Mutual Conductance type designed to provide either REPLACE -- GOOD readings or mutual conductance values in micromhos. Provision is made for locating shorts and leakages between tube elements. A sensitive noise test is also provided.

c. Mutual conductance values in three ranges can be measured: 0-3000, 0-6000, and 0-15,000 micromhos. Included in this tube tester is an ENGLISH reading range. By means of this range, a good tube will cause the pointer of the indicating meter to rest in the GREEN (GOOD) sector of the meter scale. A bad tube will read in the RED (REPLACE) or doubtful (?) sector.

d. Gas Test: Provision is made to test amplifying vacuum tubes for gas content. Gassy tubes will ruin the automatic volume control or intermediate stages of a radio receiver.

2. TUBE COMPLEMENT. -- The Model 533A requires one #83 mercury vapor rectifier and one 5Y3GT vacuum rectifier tube for its operation. These tubes are supplied and installed in the tube tester. The fuse lamp is a standard #81 auto lamp. The neon lamp is type N.E. 51, 1/25 watt bayonet base.

SECTION 11

FUNCTIONS OF THE COMPONENTS

3. LINE VOLTAGE ADJUSTMENT. -- The Model 533A Tube Tester operates from A.C. power lines of 105 to 125 volts, 60 cycles. After the power is turned on, press the push switch P7 (LINE ADJ.) which will cause the indicating meter pointer to move up scale. The button P7 is held down and the knob, LINE ADJUST, is turned until the meter pointer rests exactly over the mark, LINE TEST, at 1500 on the meter scale. This establishes standard voltages to the tube elements. This adjustment is made with the control settings properly arranged for the tube being tested and with the tube in its test socket.

4. SELECTORS. -- The row of selector dials across the center of the control panel is for the purpose of conducting proper voltages to the tube's base pins. The operation of setting these dials is similar to DIALING A TELEPHONE NUMBER. On the roll data chart, below the word SELECTORS, appear the dialing numbers. These dialing numbers consist of two letters and five figures. Example: JR-6237-5. Starting at the left, the first dial is turned to the letter "J". The second dial is turned to "R". The third dial

indicates 6; the fourth, 2; the fifth, 3; the sixth, 7 and the seventh, 5. The lettered dials control the filament or heater connections. The numbered dials control the GRID, PLATE, SCREEN, CATHODE and SUPPRESSOR in that order. In the example given above the heater terminals are connected to pins 8 and 1. The GRID is connected to pin 6; PLATE, to pin 2; SCREEN, to pin 3; CATHODE, to pin 7 and SUPPRESSOR, to pin 5.

These dial switches are electrically interlocked in such a way that it is impossible to connect two different voltage elements to the same pin. Thus accidental shorts are avoided.

The dialing system is designed so that a minimum of dial setting is required. For example, the heater setting is practically always JR so that these two dials seldom need resetting. It will also be noticed that when testing duo - diode triode tubes the amount of dialing has been reduced to a minimum.

5. SHORT TEST. -- Turning the SHORTS switch successively through the position 1-2-3-4-5 connects the various pairs of elements in turn across the test voltage. Tubes having shorted elements will complete the circuit and cause the neon SHORT lamp to glow. Tubes may be tested for shorts, either hot or cold.

A short is indicated by a steady glow of the neon lamp in certain positions of the SHORTS switch. A shorted tube should be discarded without further test.

An improved Short Test is incorporated in the design of this tube tester. Wide experience has demonstrated that most satisfactory results are obtained when tubes are classified for short test purposes.

The toggle switch is thrown to miniature and subminiature position for all subminiature, button seven pin and button nine pin tubes. The other position is used for tubes having regular base pins, including loktal base tubes.

HEATER CATHODE LEAKAGE

A particularly troublesome defect in tubes, especially those used in television, is a leakage between heater and cathode. This leakage may be quite high, sometimes running to several megohms. It may be too high to cause the neon lamp to glow in the ordinary way. However, these leaks may be detected on your new Model 533A.

You will note that a heater-cathode short will cause the neon lamp to glow on position 1 (one). While the short switch is resting on position 1, during short test operation a condenser will be charging through the leak. If the switch is turned from position 1 to position 2, a sharp flash of the neon lamp will be seen. This will not repeat until the switch is again turned to position 1 allowing the condenser to recharge through the leakage. Many baffling cases of trouble can be located in this way.

6. LOCATING SHORTED ELEMENTS. -- In the following table (X) under any SHORT switch position indicates that the neon lamp glows in that position.

KIND OF SHORT	1	2	3	4	5
HEATER - CATH.	X				
HEATER - GRID.	X	X			
HEATER - SCRN.	X	X	X		
HEATER - PLT.	X	X	X	X	
HEATER - SUP.	X	X	X	X	X
CATH. - GRID.		X			
CATH. - SCRN.		X	X		
CATH. - PLT.		X	X	X	
CATH. - SUP.		X	X	X	X
GRID. - SCRN.			X		
GRID. - PLT.			X	X	
GRID. - SUP.			X	X	X
SCRN. - PLT.				X	
SCRN. - SUP.				X	X
PLT. - SUP.					X

7. NOISE TEST. -- The short test circuit is also used in making noise tests on vacuum tubes. Connections are made from the noise test jacks to the antenna and ground posts of any radio receiver. The tube under test is tapped with the finger as the SHORTS switch is turned through positions 1-2-3-4-5.

Intermittent disturbances which are too brief to register on the neon lamp will be reproduced by the loud speaker as static.

8. GAS TEST -- DOES NOT APPLY TO RECTIFIER TUBES. The push switch P5 (Gas 1) and P6 (Gas 2) are used to test an amplifier tube for gas content.

a. The MICROMHO switch is set on 300C

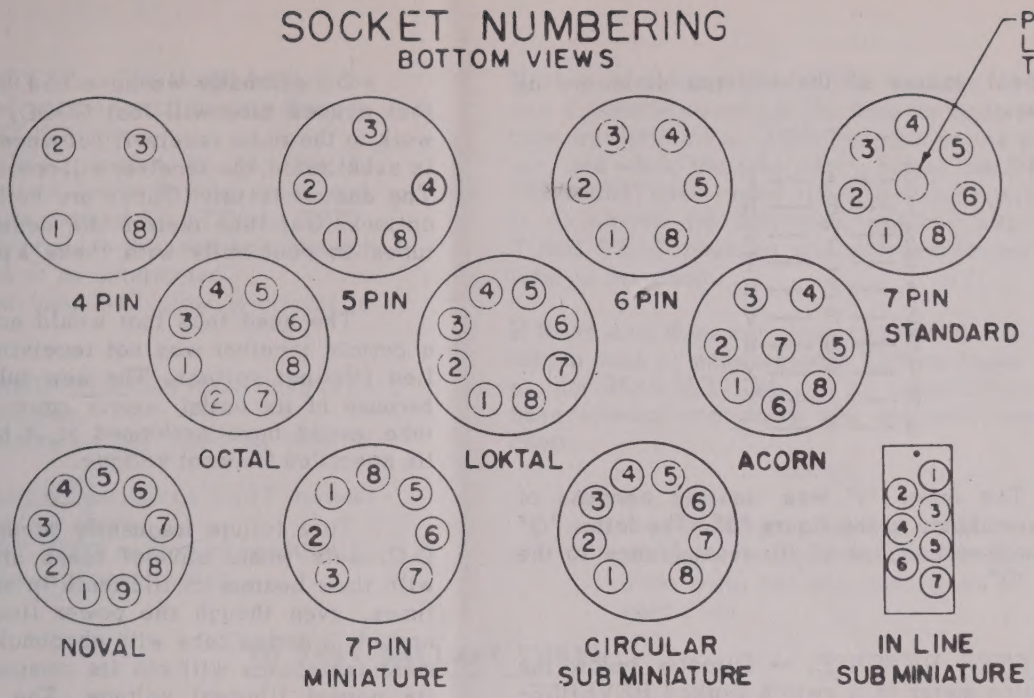
b. The push switch P5 is pressed and held down while the BIAS dial is turned to cause the pointer of the indicating meter to read 100 micromhos.

c. P5 is held down and P6 is pressed.

d. If the tube contains gas the meter pointer will move up the scale. If the pointer movement is not more than one small division of the scale the gas content is satisfactory.

NOTE

With some tubes, such as the type 45, the micromho reading cannot be



brought down to 100 by turning the BIAS dial. In such a case turn the BIAS dial to 100 and test for gas.

Some tubes develop gas after being heated for a period of time. If a tube is suspected, allow it to heat for a few minutes.

9. DYNAMIC MUTUAL CONDUCTANCE. -- The push switch P4 is used when testing for mutual conductance value. The indicating meter will register the tube's value in MICROMHOS in three ranges: 0-3000, 0-6000 and 0-15,000. The range to be used is controlled by the MICROMHO switch When measuring micromhos in any of the three ranges listed above, no setting of the ENGLISH dial is required.

The fourth range, ENGLISH, on the MICROMHO switch is used when it is desired to test the tube in terms of GOOD-REPLACE. In this case the ENGLISH dial must be set in accordance with the figures given on the data chart under the heading, ENG. When using the ENGLISH range, good tubes will cause the meter pointer to read in the GOOD sector. Worn out tubes will read in the REPLACE sector. Those tubes which read in the sector marked (?) have some useful life but should be replaced soon. The ENGLISH reading scale is also based on Dynamic Mutual Conductance. It is not an emission test.

The Micromho values printed on the data roll are average values. A small variation above or below these average values is to be expected even with new tubes.

The ENGLISH scale is designed to make tubes read at the left edge of the GREEN (GOOD) sector when 25% below average for amplifier tubes and 35% below average for power tubes.

10. RECTIFIER TEST. -- The push switch P1, P2 and P3 are used to test various types of rectifier elements.

a. The push switch P1 is used when testing detector diodes. It applies a low voltage which will not injure the delicate cathode. Good diodes will cause the meter pointer to read above the mark, DIODES OK. Certain pentode tubes such as the 6AJ5 are tested with reduced screen voltage. This is accomplished by holding down P1 and pressing P4. See instructions in notations column of chart for each tube requiring reduced screen voltage.

b. Push switch P2 is used when testing cold cathode rectifiers such as the OZ4. This applies a voltage sufficiently high to ionize the tube and start conduction. Good tubes will read in the GREEN (GOOD) sector of the meter.

c. Push switch P3 is used when testing ordinary rectifier tubes such as the 5Y3. This switch applies a medium voltage which is best adapted to reveal defects in this type of tube. Good tubes will read in the GREEN (GOOD) sector of the meter.

NOTE

Before pressing P1, P2, P3 or P5, the MICROMHO switch must be set on ENGLISH.

11. SOCKET NUMBERING. -- In order to reduce dialing to a minimum, the sockets in the Model 533A Tube Tester are numbered as shown in Plate 1, which shows the bottom views. The

numerical values of the lettered dials are as follows:

0 ----- A ----- P
1 ----- B ----- R
2 ----- C ----- S
3 ----- D ----- T
4 ----- E ----- U
5 ----- F ----- V
6 ----- G ----- W
7 ----- H ----- X
8 ----- J ----- Y
9 ----- K ----- Z

The letter "I" was omitted because of its resemblance to the figure "1". The letter "Q" was omitted because of its resemblance to the figure "0".

12. METER REVERSE. -- Directly below the indicating meter is a switch marked REVERSE-NORMAL. With certain tubes such as the 117N7, the meter, when set on NORMAL, will deflect backwards (to the left) when push switch P3 is pressed for rectifier test. In such case, turn the meter switch to REVERSE which will cause the pointer to move up the scale. After this test has been made, return the switch to NORMAL.

13. TOP CAPS. -- There are two jacks in the upper center of the control panel marked GRID and PLATE. These are used when making connection to the top cap of the tube being tested. On the data chart in the NOTATIONS column opposite tube types having top caps, is the notation CAP=G or CAP=P. G means that the top cap is connected to the GRID and P, to the PLATE jack.

NOTE

The center of the seven pin socket is used to check pilot lamps. Voltages up to 12.6 are available for pilot lamp test. These voltages are controlled by the filament switch. No further switch setting is necessary.

14. SPECIAL NOTES. -- Power line voltage varies with different localities. It may also vary with the different hours of the day.

While a national survey indicates that the average voltage for the USA is about 117 volts, it does not mean that every locality maintains a constant voltage at that level.

Occasionally we have had the complaint that a used tube will test GOOD, but will not work in the radio receiver; but when a NEW tube is substituted, the receiver will operate correctly. The answer is this: Tubes are built to specifications. Our tube testers are designed to test tubes in conformity with these specifications.

The used tube that would not perform in a certain receiver was not receiving its specified filament voltage. The new tube performed because of its initial reserve capacity. The used tube would have performed if it had received its specified filament voltage.

Tube failure frequently occurs in A.C. -- D.C. sets where several tubes are connected with their heaters or filaments in series. Sometimes, even though the power line voltage is normal, a series tube with abnormally high filament resistance will rob its companion tube of its normal filament voltage. The robbed tube apparently fails; but when tested under specified conditions, the tube will test GOOD.

15. The model 533A MICROMHO DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER is equipped with a special feature to enable LIFE TEST to be made on the tube. In the Lower Right of the control panel is a switch designated NORMAL and LIFE TEST.

LIFE TEST – DOES NOT APPLY TO RECTIFIER TUBES.

a. Measure the mutual conductance in the ordinary way with switch on NORMAL.

b. Set the MICROMHO range switch on ENGLISH.

c. Press P4 and adjust the ENGLISH dial until the tube reads in the GREEN (GOOD) sector at 2000 on the scale.

d. While holding everything else constant, throw switch to LIFE TEST. This reduces cathode temperature.

e. If the meter still reads in the GREEN (GOOD) sector, the tube has a large life reserve and will perform satisfactorily.

f. After making LIFE TEST return the switch to NORMAL for all other tests.

g. Rectifier tubes have no mutual conductance. In making life test on rectifier tubes first set FILAMENT switch to normal value. After tube is thoroughly heated, make test, then reduce filament voltage by one position on the FILAMENT switch and note loss of reading on the meter. It should not drop more than 25 percent.

16. CONTINUITY TEST.--The Model 533A Tube Tester can be used to test for continuity through resistance up to 200,000 ohms.

a. Set SHORTS switch on position 4.

b. Connect two leads having prods and pin tips to the jacks marked PLATE and GRID.

c. Touch the prods to the terminals through which continuity is to be determined.

d. The neon lamp will glow if circuit is continuous.

17. FILAMENT AND HEATER CONTINUITY.

1. Turn Tester on .

2. Set selectors as per chart for tube to be tested.

3. Set FILAMENT switch on BLST instead of voltage indicated on chart.

4. Set SHORT TEST switch on position 5.

5. Place tube in proper socket.

If the neon lamp glows, the filament is good and a complete test should then be made on the tube, by setting FILAMENT switch on the proper tap, and while the tube heats, rotate the SHORT TEST SWITCH several times thru all positions. If no shorts are indicated, set the switch in TUBE TEST position and proceed to test the tube as per chart.

If Neon lamp does not glow, filament is open and further test is unnecessary. Certain tubes such as the 35Z5-50Z7, etc., with tapped filaments have special continuity test settings, see roll chart.

NOTE

It sometimes happens that a filament will show continuity when cold, but will open when it warms up.

TO TEST BALLAST TUBES

1. Turn Tester on.
2. Set filament switch to BLST.
3. Set SHORT TEST switch on 5.
4. Set first selector switch (lettered A to K) to letter shown in column marked (first selector switch). Set all numbered selectors on zero.
5. ROTATE second selector switch (lettered P to Z) from P to Z. NEON LAMP SHOULD LIGHT IN POSITIONS NOTED.

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1L1-1N1-1P1-1Q1-1R1G-1S1G-1T1G-1U1G-1V1-1Y1-1Z1-2	J	R						
2UR224	J			T				X
2LR212	H	R	S		U			
3	J	R						
03G	J			T				
4-5	J	R						
6-133	J			T				
6-6AA	J	R						
7-8-9	J	R						
10A-10AG	J			T				
10AB	J			T				X
K17B-M17C-BM17C	J			T				X
M17HG-M17H	J D	R	S					X
K23B-K23C-KX23B-KX30C	J			T				X
M30H	J D	R	S					X
30A-K30A	J			T				
K30D	J	R		T				X
33A-33AG	J			T				
K34B	J			T				X

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
36A	J			T				
K36B-BK36B-L36C-BM-L36C-KX36C	J			T				X
KX36A	J	R						
36D-L36D	J	R		T				X
L36DJ	J	R		T	U			X
K36H-M36H-M36HG	J D	R	S					X
L40S1-L40S2	J	R		T		V		
42A	J			T				
42A1	H				U			
42A2-42B2	H		S		U			
K42B-L42B-M42B-KX42B-LX42B-L42BX-K42C-L42C-M42C	J			T				X
BK42D-K42D-L42D	J	R		T				X
LX42D-L42DX	J	R	S	T				
K42E-L42E	J			T				X
L42F	J D	R						X
42HA-K42HJ-M42H-M42HG	J E	R	S	T				X
KX42C	J			T				X
L42S1	J	R		T		V		
49A-49AJ-K49AJ	J			T				
KX49A	J			T				X
49A1	H				U			
49A2-49B2	H		S		U			
K49B-L49B-M49B-BM49B-K49C-M49C-BM49C-BK49C-K49E-L49E	J			T				X
K49D-BK49D-L49D	J			T				X
L49F	J D	R						X
M49H-M49HG	J D	R	S					X
KZ49B-KZ49C	J	R				V		
K49BJ-L49BJ	J			T	U			X
L49S2	J	R		T		V		
49AJ-K49AJ	J			T				
KX49B-LX49B-LX49C	J			T				X
L49DJ	J	R		T	U			X
L49S3	J	R		T		V		
50A2	J	R		T				
50A2MF-50B2	J	R				V		
50X3	J	R						
K52H-M52H	J D	R	S					X

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
K54B	J			T				X
55A-K55A	J			T				
55A1	H				U			
KX55A	J	R						
55B-K55B-M55B-BM55B-L55BG-LX55B	J			T				X
55A2-55B2	H		S		U			
K55C-L55C-KX55C	J			T				X
K55CP	J			T		V		X
K55D-L55D	J	R		T				X
L55E-M55E	J			T				X
L55F-M55F-BL55F	J D	R						X
K55H-M55H-M55HG	J D	R	S					X
L55S1-L55S2	J	R		T		V		X
60R30G	J	R		T				
64.23	J			T				
67A	J			T				
K67B-L67B	J			T				X
L73B-K74B-L74B-CX74C	J			T				X
80A	J			T				
K79B-K80B-M80B-K80C-KX80B-L80B	J			T				X
K80F	J D	R						X
KX87B-LX87B-L90B	J			T				X
K90F-M90F-K92F-M92F	J D	R						X
92A	J			T				
L92B-95K2	J			T				X
L99D	J	R		T				X
100R8	J			T				X
120R	J	R						
120RS-135K1	J			T				X
135K1A	J			T	U			X
140L4-140L8-L40R4-140R8	J	R		T				
140R	J	R						
140L44-140R44	J	R	S	T				
165L4-165R4-165R8	J	R		T				
165R	J	R						
165L44-165R44	J	R	S	T				
185L4-185L8-185R4-185R8	J	R		T				
185R	J	R						
185L44-185R44	J	R	S	T				
200R-250R	J	R						
250R8-290L4	J			T				X
300R4-320R4	J			T				X
340	J	R						
808-1	J			T	U			X
E14980-W43357-W4588-3613	J			T				X
3334-3334A	J	R		T				X
8593-8598-8601-8664	J			T				X
3ER248	J	R		T	U			X
3CR241	J	R		T				X

TEST DATA FOR BALLAST TUBES

TUBE TYPE	First Selector	Neon Lamp Should Light in These Positions							
B9M15822	B			T					
	E					V			
	G							X	Y
B9M16067	J	R		T		V	W	X	
B9M16275	B			T	U	V	W	X	Y
B9M16534	J	R		T		V	W	X	
B9M17571	H	R		T					
	J				U	V		X	
B9M18941	B		S	T					
	E					V			
	G							X	Y
17A470303	J	R	S			V			
	D				U				
	G							X	
17A485459	J	R	S				W		
	D				U				
TBR102D	B		S	T	U	V			
	G							X	Y
TBR103D	B		S		U	V			
	G							X	Y
TBR104D	B		S	T	U	V			
	G							X	Y
397021	B		S	T					
397022	E					V	W		
397023	J							X	
397036	C					V			
407100	J	R	S			V			
408100	J	R	S			V			
	D				U				
SW507300	J	R		T		V	W	X	
571606	B		S	T					
	E					V	W		
	J							X	

PARTS LIST FOR MODEL 533A TUBE TESTER

NOTE: There is a minimum billing charge of $1.50 for any one parts order.

HICKOK CODE NO.	NAME AND DESCRIPTION	REF. SYMBOL OR FUNCTION
2490-260	BOOKLET: Instruction	
2920-7	BUTTON, Push: black	
2920-8	BUTTON, Push: red	
3085-45	CAPACITOR: 50 mfd, 6 volts, Sprague type "DEE"	C4
3095-8	CAPACITOR: 470 mmf, 500 V, 10%, mica	C2
3095-41	CAPACITOR: .0027 mfd, 500 V, 10%, mica	C3
	CAPACITOR: Same as C3	C5
3105-175	CAPACITOR: .05 mfd, 400 V, paper	C1
3200-47	CHART: Data Roll	
4160-66	DIAL, Ass'y: with knob	ENGLISH
4160-67	DIAL, Ass'y: with knob	BIAS
10300-1	JACK: red, EBY #52	
10300-2	JACK: black, Eby #52	
11500-11	KNOB, Ass'y: Hickok bar knob with pointer	
12270-14	LAMP: neon glow, 1/25 W, N.E. 51, bayonet base	
12270-2	LAMP: auto, Tung-Sol #81, bayonet type	
12270-12	LAMP: #47 G.E., 6-8 V, .15 amp, miniature bayonet base.	
12270-17	LAMP: #49 Pilot, .06 amp., 2 volts	FUSE LAMP
12450-180	LEAD, Ass'y: Grid cap pinned at one end, Amphenol #63-1W	
12450-145	LEAD, Ass'y: 48" long	
660-005	METER: Model 66, 0-500 ua, 230 ohms, black flush square, internal pivot	
16926-4	POTENTIOMETER: 150-150 ohms, dual, linear, wire wound Mallory #MM150P, calibrated	R4, R5
16926-5	POTENTIOMETER: Ass'y, 3000 ohms	BIAS, R7
18410-472	RESISTOR: 47 ohms, 1/2 W, 10%, fixed, composition	R21, R22, R23
18413-181	RESISTOR: 180,000 ohms, 1/2 W, 5%, fixed, comp.	R11, R31
18414-152	RESISTOR: 150,000 ohms, 10%, 1/2 W	R31
18414-182	RESISTOR: 180,000 ohms, 1/2 W, 10%, fixed, comp.	R8
18414-121	RESISTOR: 120,000 ohms, 1/2 W, 5%, fixed, comp.	R10, R26
18415-102	RESISTOR: 1 meg, 1/2 W, 10%, fixed, composition	R27
18422-122	RESISTOR: 1200 ohms, 1 W, 10%, fixed, composition	R2
18423-151	RESISTOR: 15,000 ohms, 1 W, 5%, fixed, composition	R3
18525-328	RESISTOR: 215,000 ohms, 1%, Continental Carbon Type X-1/2	R24
18525-427	RESISTOR: 500 ohms, 1/2 W, 1%	R29, R30
18525-544	RESISTOR: 12 ohms, 1%, 1/2 W, fixed, deposited film	R9
18525-545	RESISTOR: 135 ohms, 1%, 1/2 W	R28
18525-546	RESISTOR: 109 ohms, 1%, 1/2 W	R16, R18
18525-547	RESISTOR: 133 ohms, 1%, 1/2 W	R19
18525-548	RESISTOR: 41 ohms, 1%, 1/2 W	R15, R17
18525-549	RESISTOR: 33 ohms, 1%, 1/2 W	R20
18575-12	RESISTOR: 1800 ohms, 10 W, 10%, fixed, vitreous enamel	R1
18575-19	RESISTOR: 100 ohms, 10%, vitreous enamel, centertapped	R12, R13
18575-89	RESISTOR: 8500 ohms, 10 W, 10%, vitreous enamel, wire wound	R6
18750-2	RHEOSTAT: 200 ohms, 25 W, Ohmite #2878-3SC	R25
19350-1	SOCKET: Small bayonet, Drake #6141-CH-LT	
19350-43	SOCKET: Acorn, 7-contact, Alden #457 V1M	
19350-62	SOCKET: 9-pin, black, Cinch	
19350-76	SOCKET: 7-pin miniature, Amphenol #147-170-24	
19350-157	SOCKET: 4-pin, Cinch #X-154	
19350-93	SOCKET: 4-pin, Amphenol #78S-4	
19350-94	SOCKET: 5-pin, Amphenol #78S-5	
19350-95	SOCKET: 6-pin, Amphenol #78S-6	
19350-96	SOCKET: 7-pin, Amphenol #78-7CD	

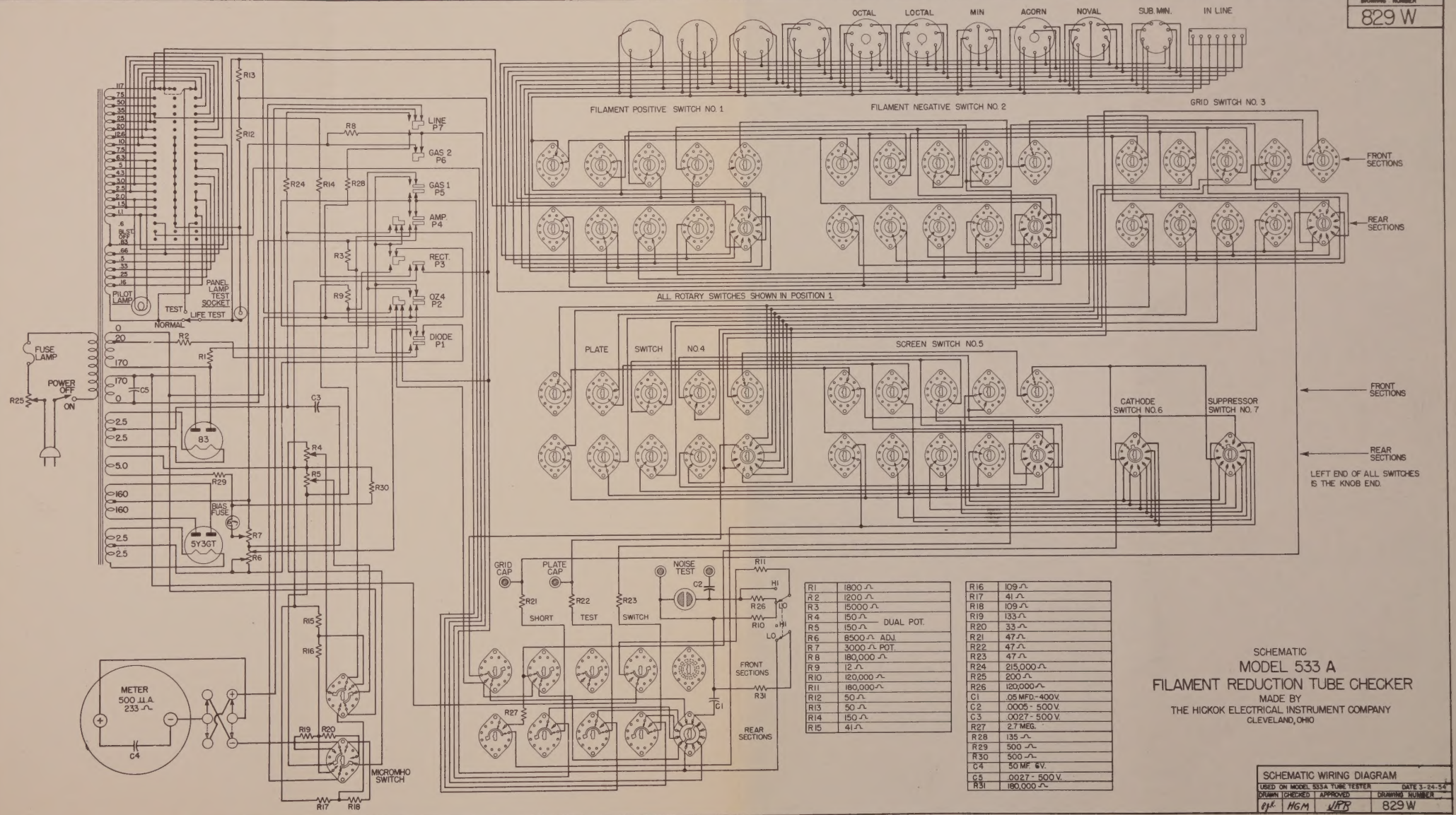
PARTS LIST FOR MODEL 533A TUBE TESTER

NOTE: There is a minimum billing charge of $1.50 for any one parts order.

HICKOK CODE NO.	NAME AND DESCRIPTION	REF. SYMBOL OR FUNCTION
19350-97	SOCKET: 8-pin loktal, Amphenol #78-8L	
19350-99	SOCKET: 8-pin octal, Amphenol #78-S8	
19350-101	SOCKET: Sub-miniature, Cinch #EXP-8694	
19350-112	SOCKET, Ass'y: Panel light, Drake #40	
19350-119	SOCKET: Sub-miniature, 7-contact, Cinch #EXP-8736-B1	PILOT
19350-156	SOCKET: Wafer, octal, Cinch #11961	IN-LINE
19910-54	SWITCH: Push button, 7-gang, Oak #43927-130	
19911-7	SWITCH: Snap, DPDT, Oak #16743-78	P1-P7
19911-9	SWITCH: Toggle, SPST, A.H. & H. #20994-DA, with bat handle	METER REVERSING
19911-38	SWITCH: Toggle, DPDT	OFF-ON
19911-19	SWITCH: Toggle, SPDT, A.H. & H. #21350	SHORT TEST
19912-269	SWITCH: Rotary, 1 section 4 position, flatted shaft, Oak Mfg.	LIFE TEST
19912-198	SWITCH: Rotary, 2 section, 3 pole, 20 position, nonshorting, Oak Type F	MICROMHO FILAMENT
19912-203	SWITCH: Rotary, 5 section, 6 position, Oak Type F	SHORT TEST
19912-204	SWITCH: Rotary, 5 section, 10 position, non-shorting, Oak Type F	SELECTORS
19912-205	SWITCH: Rotary, 1 section, 10 position, Oak Type F	CATHODE-SUPPRESSOR
20800-74	TRANSFORMER: Power, Trans. Eng. #TR-4180	
20875-6	TUBE: 5Y3GT/G	RECTIFIER
20875-28	TUBE: 83	RECTIFIER

In ordering parts or material for this instrument, the serial number must be given in order to identify properly the material required.

DRAWING NUMBER
829 W



R1	1800 Ω
R2	1200 Ω
R3	15000 Ω
R4	150 Ω
R5	150 Ω DUAL POT.
R6	8500 Ω ADJ.
R7	3000 Ω POT.
R8	180,000 Ω
R9	12 Ω
R10	120,000 Ω
R11	180,000 Ω
R12	50 Ω
R13	50 Ω
R14	150 Ω
R15	41 Ω

R16	109 Ω
R17	41 Ω
R18	109 Ω
R19	133 Ω
R20	33 Ω
R21	47 Ω
R22	47 Ω
R23	47 Ω
R24	215,000 Ω
R25	200 Ω
R26	120,000 Ω
C1	.05 MFD - 400 V.
C2	.0005 - 500 V.
C3	.0027 - 500 V.
R27	2.7 MEG.
R28	135 Ω
R29	500 Ω
R30	500 Ω
C4	50 MF 6V.
C5	.0027 - 500 V.
R31	180,000 Ω

SCHEMATIC
MODEL 533 A
FILAMENT REDUCTION TUBE CHECKER
MADE BY
THE HICKOK ELECTRICAL INSTRUMENT COMPANY
CLEVELAND, OHIO

SCHEMATIC WIRING DIAGRAM
USED ON MODEL 533A TUBE TESTER — DATE 3-24-54

DRAWN	CHECKED	APPROVED	DRAWING NUMBER
ejk	HGM	WFR	829 W

100-533A-160-K